CLAIMS

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An orthopedic or dental implant system, which comprises:

a force transducer adapted for applying an insertion and/or extraction force;

a coupling connected to said force transducer and adapted for transmitting a force provided thereby;

an implant including an interface for connection to a patient's dental or bone structure and a coupling engagement adapted for releasable, force-transmitting connection to said coupling; and

force control means for varying the force applied by said transducer.

2. The system according to claim 1, wherein said coupling includes a proximate end connected to said force transducer and a distal end with a clevis configuration adapted for selectively clamping said implant engagement.

3. The system according to claim 2, which includes:

a mechanical fastener adapted for mounting on and securing said coupling distal end on said implant.

4. The system according to claim 3, which includes:

a pair of receivers in said distal clevis end, which are adapted for selectively receiving said mechanical fastener;

a flexible guide member with a base adapted for releasable connection to said mechanical fastener and a tip adapted for passing through said clevis end receivers; and

said guide member being adapted to place said mechanical fastener in said clevis end receivers.

5. The system according to claim 4, which includes:

said implant engagement including a passage adapted for alignment with said clevis end receivers and for receiving said mechanical fastener;

a guide wire adapted for passage through said aligned receivers and passage and for releasable connection to said guide member tip; and

said guide member having a tapered configuration with a maximum diameter at its base and a minimum diameter at its tip;

said guide member having a female-threaded receiver open at its base; and

said mechanical fastener having a male-threaded end adapted for being received in said guide member base receiver with said guide member connected to said fastener.

6. The system according to claim 2 wherein:

said implant includes a stem projecting outwardly therefrom;

said coupling clevis end is adapted for deformable, clamping engagement partially around said stem; and

said coupling includes a shaft extending from said force transducer and connected to said clevis end at an oblique angle.

7. The system according to claim 2 wherein said coupling end includes a pair of hexagonal recesses each adapted for receiving a hexagonal bolt head or a hexagonal nut.

8. The system according to claim 1 wherein said force transducer comprises a slaphammer.

9. The system according to claim 1 wherein said force transducer comprises a double-acting device powered by a power source selected from the group consisting of electrical, pneumatic and hydraulic and including a controller adapted to vary the amplitude and frequency operating parameters of the device.

10. The system according to claim 1 wherein said force transducer provides an output force with a motion characterized by one of the group comprising rotorary reciprocating motion, linear reciprocating motion, oscillatory motion and orbital motion.

11. An orthopedic or dental implant method, which includes the steps of:

providing a power force transducer with variable amplitude, frequency and directional operating parameters;

providing a power source chosen from among the group consisting of electrical, pneumatic and hydraulic power and selectively applying same to said transducer;

providing a controller including a microprocessor connected to said transducer;

preprogramming said microprocessor to control said transducer operating variables in response to predetermined conditions;

providing a coupling with a proximate end operably connected to said force transducer and a distal end;

providing an implant with a bonding portion adapted for bonding to a patient's bone structure and an engagement portion adapted for connection to said coupling;

providing a cement-filled interspace between said implant and said patient bone structure;

releasably connecting said coupling distal end to said implant engagement portion;

applying a first vibratory force with a first set of said parameters from said transducer to said implant through said coupling;

providing a sensor connected to said controller and to said patient or said implant;

producing a signal with said sensor corresponding to a condition of said patient or said implant;

receiving said signal with said controller;

providing a second vibratory force from said force transducer through said coupling to said implant;

altering said transducer operating parameters according to said sensor signal to provide a second set of transducer operating parameters; and

installing or extracting said implant with respect to said patient by the application of said vibratory force.

12. A system for installing or extracting orthopedic or dental implants or cement from the bone structure of a patient, which system comprises:

a controller including an input adapted for receiving input signals and an output;

an input device adapted for providing an input signal to said controller;

a transducer connected to said controller output and adapted for providing a repeating, variable motion in response to an output signal from said controller;

a tool connected to said transducer and adapted for fixedly engaging said implant or said cement;

said controller varying said output therefrom in response to inputs thereto, said controller inputs corresponding to operating conditions of said system; and

said transducer and said tool being adapted for vibrating and installing or dislodging said implant or said cement from said patient bone structure.

13. The system according to claim 12, which includes:

said transducer having variable direction, frequency and amplitude, which are variably controlled by said controller.

14. The system according to claim 12 wherein said input device is manually operated.

15. The system according to claim 12 wherein said input device comprises a foot pedal assembly with controls adapted for adjusting frequency and amplitude.

16. The system according to claim 12, which includes:

a sensor connected to said patient and/or said transducer, said sensor being adapted to detect a condition associated with said patient and/or said transducer;

said sensor being connected to said controller input and providing said input signals thereat; and

said controller being adapted to automatically vary the operating parameters of said transducer in response to controller input signals from said sensor.

17. The system according to claim 12 wherein said controller is adapted for automatically varying the frequency and amplitude of said transducer and is further adapted for

locking in an optimum frequency and amplitude for installing or extracting said implant or said cement.

18. An orthopedic implant revision method, which comprises the steps of:

exposing the intramedullary canal;

extracting the existing implant;

providing a transducer with a cement-working tool;

segmenting the orthopedic cement within the intramedullary canal;

operating the transducer with the tool engaging a portion of the cement;

melting said engagement portion of said cement mantel with said tool;

extending a tip of said tool into said molten or softened cement mantel engagement portion;

pausing the transducer operation;

resolidifying the cement engagement portion of the cement mantel with the tool tip embedded therein;

resuming operation of the transducer;

breaking the bond between the cement and the patient's bone structure with the transducer;

removing the cement from the patient; and

installing the replacement implant.